

**II. Rejection under 35 U.S.C. § 102(b) over U.S.P. 5,428,380 to Ebisawa ("Ebisawa")**

Claims 1 and 10 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Ebisawa.

**A. Claim 1**

Applicant submits that claim 1 is not anticipated by Ebisawa. For example, as recited in claim 1 a plurality of sub-flushing operations are intermittently repeated in one flushing operation. Also, the one flushing operation has a first time interval, and each of the sub-flushing operations includes a plurality of ink ejections that are repeated for a predetermined time during a second time interval, which is shorter than the first time interval.

On the other hand, Ebisawa does not disclose or suggest the features above. For example, column 8, lines 16-31, of the reference states that  $10^9$  pulses are applied to the recording head 1 to eject ink from the head 1 during a compulsory recovery operation, and a suction pump 22 performs a suction operation 11 times during the recovery operation. However, such portion of Ebisawa does not suggest that a plurality of sub-flushing operation are intermittently repeated in one flushing operation in the manner claimed.

In light of the discussion above, Applicant submits that claim 1 is patentable over the cited reference.

**B. Claim 10**

Claim 10 is patentable at least by virtue of its dependency on claim 1.

**III. Rejection under 35 U.S.C. § 103(a) over Ebisawa and U.S.P. 6,357,846 to Kitahara (“Kitahara”)**

Claims 6-8, 13, 14, and 16 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ebisawa in view of Kitahara. Since claims 6-8, 13, 14, and 16 depend upon claim 1 and since Kitahara does not cure the deficient teaching of Ebisawa with respect to claim 1, Applicant submits that claims 6-8, 13, 14, and 16 are patentable at least by virtue of their dependency.

**IV. Rejection under 35 U.S.C. § 103 (a) over Ebisawa and U.S.P. 6,036,299 to Kobayashi et al. (“Kobayashi”)**

Claim 9 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ebisawa in view of Kobayashi. Since Kobayashi does not cure the deficient teaching of Ebisawa with respect to claim 1, Applicant submits that claim 9 is patentable at least by virtue of its dependency.

**V. Rejection under 35 U.S.C. § 103 (a) over Ebisawa and U.S.P. 5,475,404 to Takahashi et al. (“Takahashi”)**

Claim 11 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ebisawa in view of Takahashi. Since Takahashi does not cure the deficient teaching of Ebisawa with respect to claim 1, Applicant submits that claim 11 is patentable at least by virtue of its dependency.

**VI. Rejection under 35 U.S.C. § 103 (a) over Ebisawa, Kobayashi, and Kitahara**

Claim 15 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ebisawa in view of Kobayashi and further in view of Kitahara. Since claim 15 is dependent upon claim 1, and since Kobayashi and Kitahara do not cure the deficient teachings of Ebisawa with respect to claim 1, Applicant submits that it is patentable at least by virtue of its dependency.

**VII. Allowable subject matter**

The Examiner has objected to claims 2-5, 12, and 17 for being dependent upon a rejected base claim but acknowledges that they would be allowable if they are rewritten in independent form. Since claims 2, 4, 12, and 17 have been rewritten in independent form and since claims 3 and 5 depend upon claim 2 and 4, respectively, Applicant submits that the objection is overcome.

**VIII. Newly added claims**

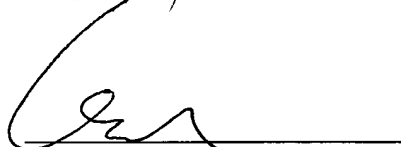
In order to provide more varied protection and to capture allowable subject matter, we propose drafting new claims 18-24.

**IX. Conclusion**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Grant K. Rowan  
Registration No. 41,278

SUGHRUE MION, PLLC  
Telephone: (202) 293-7060  
Facsimile: (202) 293-7860

WASHINGTON OFFICE



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PATENT TRADEMARK OFFICE

Date: February 10, 2003

**APPENDIX**  
**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

**Please amend page 10, first full paragraph, to read:**

Fig. 3 illustrates an example of the recording head 16 employing the piezoelectric vibrator 6 for use with the recording apparatus. This recording head 16 has an ink channel unit 1 formed with the nozzle orifices [7]8 and the pressure generating chamber 7 and a head case 2 for accommodating the piezoelectric vibrator 6, bonded together.

**Please amend page 10, second full paragraph, to read:**

The ink channel unit 1 is constituted by a nozzle plate 3 with the nozzle orifices 8 bored, a channel forming plate 4 formed with a space corresponding to the pressure generating chamber [6]7 and a common ink reservoir 9, as well as an ink supply port 10 for communicating them, and a vibrating plate 5 for enclosing an opening of the pressure generating chamber 7, laminated together.

**IN THE CLAIMS:**

**Please amend the claims in the following manner:**

1. (Once amended) An ink jet recording apparatus, comprising:  
a recording head including a nozzle orifice communicated with a pressure generating chamber;  
a pressure generator, which varies pressure of ink in the pressure generating chamber;

and

a controller, which drives the pressure generator to eject ink droplets from the nozzle orifice such that a plurality of sub-flushing operations are intermittently repeated in one flushing operation with a first time interval, when a recording operation of the recording head is not performed, each sub-flushing operation including a plurality of ink ejections repeated for a predetermined times with a second time interval which is shorter than the first time interval.

2. (Once amended) An [The] ink jet recording apparatus [as set forth in claim 1], comprising:

a recording head including a nozzle orifice communicated with a pressure generating chamber;

a pressure generator, which varies pressure of ink in the pressure generating chamber;  
and

a controller, which drives the pressure generator to eject ink droplets from the nozzle orifice such that a plurality of flushing operations are intermittently repeated with a first time interval, when a recording operation of the recording head is not performed, each flushing operation including a plurality of ink ejections repeated for a predetermined times with a second time interval which is shorter than the first time interval,

wherein an ejection frequency in a final flushing operation is higher than an ejection frequency in an initial flushing operation.

4. (Once amended) An [The] ink jet recording apparatus [as set forth in claim 1],

comprising:

a recording head including a nozzle orifice communicated with a pressure generating chamber;

a pressure generator, which varies pressure of ink in the pressure generating chamber;

and

a controller, which drives the pressure generator to eject ink droplets from the nozzle orifice such that a plurality of flushing operations are intermittently repeated with a first time interval, when a recording operation of the recording head is not performed, each flushing operation including a plurality of ink ejections repeated for a predetermined times with a second time interval which is shorter than the first time interval,

wherein the repeated number of ink ejection in a final flushing operation is greater than the repeated number of ink ejection in an initial flushing operation.

9. (Once amended) The ink jet recording apparatus as set forth in claim 1, the controller drives the pressure generator to vibrate a meniscus of ink in the nozzle orifice before an initial sub-flushing operation is performed.

10. (Once amended) The ink jet recording apparatus as set forth in claim 1, wherein:  
the recording head performs the recording operation while moving in a main scanning direction; and

the sub-flushing operations are performed when the recording head is in a stand-by state which is defined as a time period from when the recording head stops moving to when the

recording head starts moving.

11. (Once amended) The ink jet recording apparatus as set forth in claim 10, further comprising a timer, which measures a time period of the stand-by state,

wherein the repeated number of ink ejections in the respective sub-flushing operation is determined in accordance with the measured stand-by time period.

12. (Once amended) An [The] ink jet recording apparatus [as set forth in claim 10],  
comprising:

a recording head including a nozzle orifice communicated with a pressure generating chamber;

a pressure generator, which varies pressure of ink in the pressure generating chamber;  
and

a controller, which drives the pressure generator to eject ink droplets from the nozzle orifice such that a plurality of flushing operations are intermittently repeated with a first time interval, when a recording operation of the recording head is not performed, each flushing operation including a plurality of ink ejections repeated for a predetermined times with a second time interval which is shorter than the first time interval,

wherein the recording head performs the recording operation while moving in a main scanning direction,

wherein the flushing operations are performed when the recording head is in a stand-by state which is defined as a time period from when the recording head stops moving to when the



recording head starts moving,

wherein the apparatus further comprises [comprising] a timer, which measures a time period of the stand-by state,

wherein[:] the controller drives the pressure generator to vibrate a meniscus of ink in the nozzle orifice[:], and

wherein a vibrating number is determined in accordance with the measured length of the stand-by time period.

13. (Once amended) The ink jet recording apparatus as set forth in claim 1, wherein the repeated number of ink ejection in the respective sub-flushing operations is determined in accordance with the type of ejected ink.

17. (Once amended) An [The] ink jet recording apparatus [as set forth in claim 1], comprising:

a recording head including a nozzle orifice communicated with a pressure generating chamber;

a pressure generator, which varies pressure of ink in the pressure generating chamber;  
and

a controller, which drives the pressure generator to eject ink droplets from the nozzle orifice such that a plurality of flushing operations are intermittently repeated with a first time interval, when a recording operation of the recording head is not performed, each flushing operation including a plurality of ink ejections repeated for a predetermined times with a second

time interval which is shorter than the first time interval,

wherein the controller includes:

a drive signal generator, which generates a common drive signal including a flushing waveform configured to perform an ink ejection and a meniscus vibrating waveform configured to vibrate a meniscus of ink in the nozzle orifice; and

a drive waveform selector, which applies the flushing waveform and the meniscus vibrating waveform selectively to the pressure generator.